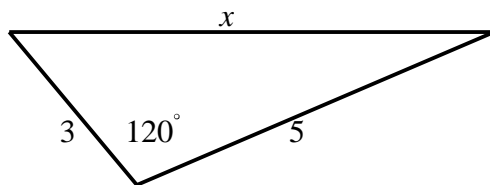


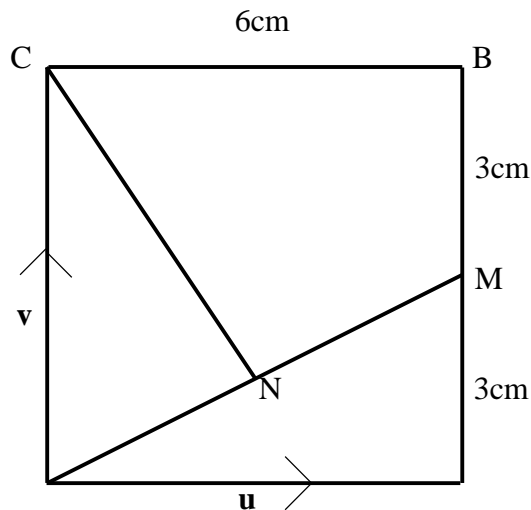
National 5

Homework AP13

1. Cleano washing powder is on special offer.
Each box on special offer contains 20% more powder than the standard box.
A box on special offer contains 900 grams of powder.
How many grams of powder does the standard box contain?
2. A toy hangs from a ceiling on a spring. Its distance d centimetres below the ceiling is given by the formula
$$d = 100 + 15\cos(270t)^\circ$$
where t is the time in seconds after the toy is released.
 - (a) How far below the ceiling is the toy when it is released?
 - (b) How close to the ceiling does the toy rise?
 - (c) How many seconds pass before the toy returns to its starting position?
3. A rectangle has length 17cm and breadth 11cm.
When the length and breadth are each increased by x cm the resulting rectangle has area 487 sq cm.
Find the value of x correct to 1 decimal place.
4. The area of triangle ABC is 20 sq units.
If $AB = 8$ units and $BC = 6$ units, find the possible sizes of angle ABC.
5.
 - (a) Expand $x + 2^2$
 - (b) Hence expand $x + 2^3$
6.
 - (a) Explain why the product of two consecutive whole numbers is even.
 - (b) Hence prove that the product of two consecutive even numbers is a multiple of 8.
7. A ship leaves port P and sails a distance of 20 km on a bearing 059° , reaching port B.
At B, the ship changes direction and sails for 25 km on a bearing of 132° to port C.
 - (a) Draw a sketch to show this information.
 - (b) Calculate the direct distance from P to C.
8. Given that $\cos 60^\circ = \frac{1}{2}$, find, without the use of a calculator, the exact value of $\cos 120^\circ$ and find the value of x in the triangle sketched below.



9. Large distances are measured in light years.
A camera on a space telescope photographs a galaxy 50 million light years away.
One light year is approximately 9.46×10^{12} kilometres.
Calculate the distance of the galaxy from the space telescope in kilometres, answering in scientific notation.
10. Express $x^2 - 4x + 11$ in the form $x - a^2 + b$.
Hence sketch the graph of $f(x) = x^2 - 4x + 11$, showing the coordinates of the turning point and The y-intercept.
11. A tank contains 10 litres of water.
A further 30 litres of water is pumped into the tank at a steady rate of 5 litres per minute.
- Draw a graph of the volume V litres against the time t minutes.
 - Find an equation connecting V and t .
12. The diagram below shows a square OABC of side 6 cm. M and N are the mid-points of AB and OM respectively.
 \overrightarrow{OA} represents the vector \mathbf{u} and \overrightarrow{OC} represents the vector \mathbf{v} .



- Find the value of $\left| \mathbf{u} + \frac{1}{2} \mathbf{v} \right|$ leaving your answer as a surd in its simplest form.
 - Find an expression in terms of \mathbf{u} and/or \mathbf{v} for (i) \overrightarrow{ON} (ii) \overrightarrow{CN}
13. The value of a Unit Trust has fallen by 30% in the last two years.
If an investment in this trust is now worth £6020, what was the investment worth 2 years ago?